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The influence of smoothing by spectral dispersion on laser scattering and beam propagation in large-scale-length plasmas relevant to National Ignition Facility hohlraums*

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We have used homogeneous plasmas of high density (up to 1.5 10^{21} electrons per cm^3) and temperature (~ 3 keV) with large density scalelengths (~2 mm) in order to approximate conditions within National Ignition Facility (NIF) scale hohlraums. Low-Z gasbag plasmas were used to emulate the uniform low-Z plasma filling most of the ignition-scale hohlraum. In addition smaller, Nova-scale hohlraums were used to replicate the shelf of gold that is ablated from the wall of the NIF hohlraum, in which the highest growth of SBS is expected to occur. Using these plasmas we have studied the dependence of stimulated Raman (SRS) and Brillouin (SBS) scattering on beam smoothing and plasma conditions at the NIF relevant laser intensity (3w at 2 $10^{15} Wcm^{-2}$). The plasmas were formed with nine of the Nova beams while a tenth beam was used as an interaction beam, with the same intensity and f/number as the beams in current NIF designs. The interaction beam was modified to have the f/8 geometry of the NIF in order to test the effect of beam smoothing in stabilizing filamentation. The beam was smoothed with a random phase plate and additional smoothing by spectral dispersion. Both SBS and SRS are affected by use of smoothing by spectral dispersion (SSD). We have also investigated the effect of smoothing on the characteristics of the beam transmitted through the plasma. The significance of the results of these different measurements will be discussed.

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Prefer oral session

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